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EXAMINER	
CASCA, FRED A	

ART UNIT	PAPER NUMBER
2617	

DATE MAILED: 05/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/733,775	MURAI, HIDESHI	
	Examiner	Art Unit	
	Fred A. Casca	2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-30 and 32-37* is/are rejected.

7)☒ Claim(s) *7 and 31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The Art Unit location of your application in the USPTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Art Unit 2617.

2. This action is in response to applicant's amendment filed on May 11, 2005. Claims 1, 3-5, 10-13, 15, 22, 24-25, and 27-31 are still pending in the present application. **This Action is made FINAL.**

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 5, 16-17, 23-24, 26-28, and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weidong et al (Vehicular Technology Conference; May 6-9, 2001; Volume 4; pages 2412-2415), in view of Takeo (Vehicular Technology Conference; IEEE 49th, Volume 3, May 16-20, 1999; pages 1804-1808).

Referring to claim 1, Weidong disclose a method for use in a cellular communications system that includes a macro cell encompassing a smaller micro cell (Fig. 5, and page 2412, right column, "macrocell, microcell"), comprising:

determining and establishing an uplink communication cell boundary between the macro cell and the micro cell, and determining and establishing a downlink communication cell boundary between the macro cell and the micro cell (Figure 5, page 2412, right column, "macrocell, microcell and picocell", "HCS", "radius of microcell", note that a HCS system is disclosed where the macro cells contain the micro cells and inherently downlink communication and uplink communication are determined and established the micro cells and macro cells in a HCS system).

Weidong does not specifically disclose down link communication cell boundary between the macro cell and the micro cell **different from the uplink communication cell boundary.**

Takeo teaches reducing the coverage zones in transmissions in a radio cells where the downlink transmission is **different from the uplink communication cell boundary** (page 1804 right and left columns, abstract, and page 1807, "In the downlink, however, when the cell area is shrunk, the total transmission power is decreased", "location of cell boundary for downlink varies", "reduce capacity in the downlink", "in the downlink, the location of cell boundary is varied according to the loss in orthogonality", note that Takeo, among other things, shows that the downlink coverage area is shrunk and there is an imbalance between the downlink coverage and uplink cell coverage).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weildong by incorporating the teachings of Takeo into that of Weildong and consequently providing the system of Weildong to allow radio cell coverage reduction in downlink capacity to cause a downlink imbalance between the macro cell and the micro cell, and consequently causing establishing a downlink communication cell boundary

between the macro cell and the micro cell **different** from the uplink communication cell boundary as suggested by Takeo, for the purpose reducing transmission power in the downlink, reducing multi-path interference, and consequently providing a better quality of service.

Referring to claim 2, the combination of Weidong/Takeo disclose the method in claim 1.

Weidong does not disclose the uplink communication cell boundary is larger than the downlink communication cell boundary.

Takeo discloses that the uplink communication cell boundary is larger than the downlink communication cell boundary (page 1804 left column and page 1807, left column, "in the downlink . . . when the cell area is shrunk").

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the method of Weidong/Takeo by providing uplink communication cell boundary is larger than the downlink communication cell boundary, for the purpose of reducing multi-path interference due to high traffic volume and providing better quality communication.

Referring to claim 3, the combination of Weidong/Takeo disclose the method in claim 2, and further disclose the downlink communication cell boundary is established by reducing a power at which a broadcast signal is transmitted from a base station associated with the micro cell (Takeo, page 1804 left column and page 1807, left column, "in the downlink . . . when the cell area is shrunk").

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weildong by incorporating the teachings of Takeo, for the

purpose of reducing multi-path interference due to high traffic volume, and providing better quality communication.

Referring to claim 5, the combination of Weidong/Takeo disclose the method in claim 2, and further disclose downlink communication cell boundary is established by decreasing a detected power level of a signal transmitted by the micro cell (Weidong, page 2413, left column, "pilot signal").

Referring to claim 16, Weidong discloses an apparatus for use in a cellular communications system that includes a macro cell encompassing a smaller micro cell (Fig. 5, and page 2412, right column, "macrocell, microcell"), comprising:

means for determining and establishing an uplink communication cell boundary between the macro cell and the micro cell, and means for determining and establishing a downlink communication cell boundary between the macro cell and the micro cell (Figure 5, page 2412, right column, "macrocell, microcell and picocell", "HCS", "radius of microcell", note that a HCS system is disclosed where the macro cells contain the micro cells and inherently downlink communication and uplink communication are determined and established the micro cells and macro cells in a HCS system).

Weidong does not specifically disclose down link communication cell boundary between the macro cell and the micro cell **different from the uplink communication cell boundary.**

Takeo teaches reducing cellular coverage zones where the downlink transmission is **different from the uplink communication cell boundary** (page 1804 right and left columns, abstract, and page 1807, "In the downlink, however, when the cell area is shrunk, the total

transmission power is decreased", "location of cell boundary for downlink varies", "reduce capacity in the downlink", "in the downlink, the location of cell boundary is varied according to the loss in orthogonality", note that Takeo, among other things, shows that the downlink coverage area is shrunk and there is an imbalance between the downlink coverage and uplink cell coverage).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weildong by incorporating the teachings of Takeo into that of Weildong and consequently providing the system of Weildong to allow radio cell coverage reduction in downlink capacity to cause a downlink imbalance between the macro cell and the micro cell, and consequently causing establishing a downlink communication cell boundary between the macro cell and the micro cell **different** from the uplink communication cell boundary as suggested by Takeo, for the purpose reducing transmission power in the downlink, reducing multi-path interference, and consequently providing a better quality of service.

Referring to claim 17, the combination of Weidong/Takeo disclose the apparatus in claim 16.

Weidong does not specifically disclose the uplink communication cell boundary is larger than the downlink communication cell boundary.

Takeo discloses the uplink communication cell boundary is larger than the downlink communication cell boundary (page 1804, left and right columns).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the apparatus of Weildong by incorporating the teachings of Takeo into that of

Weildong, for the purpose of reducing multi-path interference and providing an efficient communication system.

5. Claims 8 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weidong et al (Vehicular Technology Conference; May 6-9, 2001; Volume 4; pages 2412-2415), in view of Takeo (Vehicular Technology Conference; IEEE 49th, Volume 3, May 16-20, 1999; pages 1804-1808), and further in view of Salonaaho (US Pub. NO. 2002/0068581 A1).

Referring to claim 23, the combination of Weidong/Takeo disclose the apparatus in claim 17, and further disclose means for effectively decreasing the downlink communication cell boundary (Takeo, page 1804, abstract, and introduction).

The combination of Weidong/Takeo/Gitlin does not specifically disclose means for determining that a mobile station is moving a velocity greater than a predetermined velocity.

Salonaho discloses means for determining that a mobile station is moving a velocity greater than a predetermined velocity (abstract, and 7, 8, 22, 32, 36, and 38, "determining a speed of a subscriber").

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weidong/Takeo/Gitlin by incorporating the teachings of Salonaho and providing means for determining that a mobile station is moving a velocity greater than a predetermined velocity for the purpose providing an efficient communication system.

Referring to claim 8, the combination of Weidong/Takeo disclose the method in claim 2.

The combination of Weidong/Takeo does not disclose determining that a mobile station is moving a velocity greater than a predetermined velocity, and effectively decreasing the downlink communication micro cell boundary.

Salonaho discloses means for determining that a mobile station is moving a velocity greater than a predetermined velocity (abstract, and 7, 8, 22, 32, 36, and 38, "determining a speed of a subscriber").

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weidong/Takeo/Gitlin by incorporating the teachings of Salonaho and providing means for determining that a mobile station is moving a velocity greater than a predetermined velocity for the purpose providing an efficient communication system.

6. Claims 6, 21, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weidong et al (Vehicular Technology Conference; May 6-9, 2001; Volume 4; pages 2412-2415), in view of Takeo (Vehicular Technology Conference; IEEE 49th, Volume 3, May 16-20, 1999; pages 1804-1808), and further in view of Ranta et al (US 6233299 B1).

Referring to claim 6, the combination of Weidong/Takeo disclose the method in claim 2.

The combination of Weidong/Takeo does not disclose determining whether an uplink interference level at the micro cell base station exceeds a threshold, and if so, performing an interference cancellation operation to compensate for the uplink interference level.

Ranta discloses interference cancellation which cancel effects of co-channel interference (abstract, and col. 2, lines 5-55).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weildong/Takeo by incorporating the teachings of Ranta into that of Weildong/Takeo, for the purpose of reducing interference and providing better quality service.

Referring to claim 21, the combination of Weidong/Takeo disclose the apparatus in claim 17.

The combination of Weidong/Takeo does not disclose means for determining whether an uplink interference level at the micro cell base station exceeds a threshold, and if so, performing an interference cancellation operation at a receiver at the micro cell to compensate for the uplink interference level.

Ranta discloses interference cancellation which cancel effects of co-channel interference (abstract, and col. 2, lines 5-55).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weildong/Takeo by incorporating the teachings of Ranta into that of Weildong, for the purpose of reducing interference and providing better quality service.

Referring to claim 22, the combination of Weidong/Takeo/Ranta disclose the apparatus in claim 21,and further disclose means for determining whether to compensate for intra-cell uplink interference in the micro cell, inter-cell uplink interference in the micro cell, or both (Weidong, page 2412, introduction), means for detecting one or more parameters regarding one or more mobiles on the macro cell side of the downlink communication cell boundary (Weidong, page 2412, introduction).

The combination of Weidong/Takeo/Gitlin does not disclose means for providing the one or more parameters for use in uplink interference cancellation in the micro cell.

Ranta discloses interference cancellation which cancel effects of co-channel interference (abstract, and col. 2, lines 5-55).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weildong/Takeo/Gitlin by incorporating the teachings of Ranta, for the purpose of reducing interference and providing better quality service.

7. Claims 4, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weidong et al (Vehicular Technology Conference; May 6-9, 2001; Volume 4; pages 2412-2415), in view of Takeo (Vehicular Technology Conference; IEEE 49th, Volume 3, May 16-20, 1999; pages 1804-1808), and further in view of Kim et al (US 6456652 B1).

Referring to claim 4, the combination of Weidong/Takeo disclose the method in claim 2.

The combination of Weidong/Takeo does not disclose the downlink communication cell boundary is established by tilting a downlink antenna beam of a base station associated with the micro cell that transmits a broadcast signal from the micro cell to reduce the coverage of the broadcast signal.

Kim discloses the downlink communication cell boundary is established by tilting a downlink antenna beam of a base station associated with the micro cell that transmits a broadcast signal from the micro cell to reduce the coverage of the broadcast signal (col. 1, lines 5-45, col. 2, lines30-50).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the teachings of Kim into the method of Weidong/Takeo, and providing the downlink communication cell boundary to be established by tilting a downlink antenna beam of a base station associated with the micro cell that transmits a broadcast signal from the micro

cell to reduce the coverage of the broadcast signal, for the purpose of optimizing cell coverage to a first order.

Referring to claim 19, the combination of Weidong/Takeo disclose the apparatus in claim 17.

The combination of Weidong/Takeo does not disclose the downlink communication cell boundary is established by tilting a downlink antenna beam of a base station associated with the micro cell that transmits a broadcast signal from the micro cell to reduce the coverage of the broadcast signal.

Kim discloses the downlink communication cell boundary is established by tilting a downlink antenna beam of a base station associated with the micro cell that transmits a broadcast signal from the micro cell to reduce the coverage of the broadcast signal (col. 1, lines 5-45, col. 2, lines30-50).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the teachings of Kim into the method of Weidong/Takeo, and providing the downlink communication cell boundary to be established by tilting a downlink antenna beam of a base station associated with the micro cell that transmits a broadcast signal from the micro cell to reduce the coverage of the broadcast signal, for the purpose of optimizing cell coverage to a first order.

8. Claims 9-12, 14, 16-18, 20, 23-24, 25 26-28, and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weidong et al (Vehicular Technology Conference; May 6-9, 2001; Volume 4; pages 2412-2415), in view of Takeo (Vehicular Technology Conference; IEEE

49th, Volume 3, May 16-20, 1999; pages 1804-1808), and further in view of Gitlin et al (US Patent No. 6438379 B1).

Referring to claim 9, Weidong discloses a method for use in a cellular communications system that includes a macro cell encompassing a smaller micro cell (Fig. 5, and page 2412, right column, "macrocell, microcell"), the macro cell including a macro cell base station and the micro cell including a micro cell base station (Fig. 5, and page 2412, right column, "macrocell, microcell", "radius of microcell"), comprising:

determining a downlink micro cell boundary between the macro cell and the micro cell, wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station, and an uplink micro cell boundary between the macro cell and micro cell wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station (Figure 5, page 2412, left columns, "HCS", "macrocell, microcell", "the radius of the macrocell . . . microcell . . . antennas of the microcell", note that HCS system is disclosed where a macrocell has microcells in its coverage range, and further a HCS system ,with microcells and macrocells, inherently provides determining a downlink micro cell boundary between the macro cell and the micro cell, wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station, and an uplink micro cell boundary between the macro cell and micro cell, wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station).

Weidong does not specifically disclose **determining whether a condition in the system indicates that** a downlink micro cell boundary between the macro cell and the micro cell, wherein the downlink cell boundary is associated with an effective range of a transmission from

micro cell base station, and an uplink micro cell boundary between the macro cell and micro cell **should be unbalanced** wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station; **and if the condition is met, reducing the downlink micro cell boundary to effect an unbalance between the uplink and downlink microcell boundaries.**

Takeo teaches a method of reducing cellular coverage areas, and further discloses **a condition in the system indicates reducing the downlink micro cell boundary** to effect an unbalance between the uplink and downlink microcell boundaries (page 1804 right and left columns, abstract, and page 1807, "In the downlink, however, when the cell area is shrunk, the total transmission power is decreased", "location of cell boundary for downlink varies", "reduce capacity in the downlink", "in the downlink, the location of cell boundary is varied according to the loss in orthogonality", note that Takeo, among other things, shows that the downlink coverage area is shrunk and there is an imbalance between the downlink coverage and uplink cell coverage. Further, loss of orthogonality is the condition).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weildong by incorporating the teachings of Takeo into that of Weildong and consequently providing the system of Weildong to provide a condition, where when the condition is met would provide information that an unbalance in cellular coverage should take place, and further to allow cell a reduction in downlink capacity to cause a downlink imbalance between the macro cell and the micro cell, and consequently causing establishing a downlink communication cell boundary between the macro cell and the micro cell **different** from the uplink communication cell boundary as suggested by Takeo, for the purpose reducing

transmission power in the downlink, reducing multi-path interference, and consequently providing a better quality of service.

The combination of Weildong/Takeo does not specifically disclose **determining whether** a condition in the system indicates that a downlink micro cell boundary between the macro cell and the micro cell, wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station, and an uplink micro cell boundary between the macro cell and micro cell **should be** unbalanced wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station; **and if the condition is met,** reducing the downlink micro cell boundary to effect an unbalance between the uplink and downlink microcell boundaries. Note that the bolded words and phrases are the only parts that the combination of Weildong/Takeo does not specifically disclose.

Gitlin discloses a HCS system with macrocells and microcells, and further discloses **determining whether** a condition in such HCS system is met and **if the condition is met,** reduce the coverage area of the microcell (Figures 2-3, abstract, and col. 1, lines 5-16, col. 3, line 7 through col. 4, line 45, "the u-cell so that it can support a reasonable number of users", "a larger r and smaller d leads to a smaller average receive power at the u-base", "Hence d and r are chosen so that the u-base is robust against the M-users and can support a reasonable number u-users", "the microcell size and location is selected, and the uplink and downlink transmission power is controlled, so that the respective microcell and macrocell users can communicate without noticeable interference between each other", note that downlink transmission power of the microcell is directly related to the coverage area of the microcell, and further note that the

coverage or power of the microcell is reduced so that the respective users of microcell can communicate without interference and with a great quality service).

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Weidong/Takeo by incorporating the teachings of Gitlin, and consequently providing **determining whether a condition in the system indicates that** the downlink micro cell boundary between the macro cell and the micro cell (method of Weidong/Takeo), wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station, and an uplink micro cell boundary between the macro cell and micro cell (method of Weidong/Takeo) **should be unbalanced** wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station; **and if the condition is met, reducing the downlink micro cell boundary to effect an unbalance between the uplink and downlink microcell boundaries**, motivation being to reduce interference, to provide a better quality of service, to reduce channel traffic in the crowded areas, and eliminate congestion.

Referring to claim 10, the combination of Weidong/Takeo/Gitlin discloses the method in claim 9.

The combination of Weidong/Takeo/Gitlin does not disclose the condition is based on a probability that a mobile station in the system will not receive a predetermined service quality when the uplink and downlink micro cell boundaries are balanced.

Takeo discloses the condition is based on a probability that a mobile station in the system will not receive a predetermined service quality when the uplink and downlink micro cell boundaries are balanced (page 1804, introduction, note that normally the capacity in the

downlink is larger than that in the uplink and further in CDMA systems, communications quality depends on traffic load and amount of interference from the neighboring cells, thus reducing the downlink coverage to an unbalance level would decrease the downlink capacity and therefore reduce the probability that a mobile station will not receive a predetermined service quality).

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Weildong/Gitlin by incorporating the teachings of Takeo and consequently providing condition to be based on a probability that a mobile station in the system will not receive a predetermined service quality when the uplink and downlink micro cell boundaries are balanced, for the purpose of providing better quality service.

Referring to claim 11, the combination of Weidong/Takeo/Gitlin disclose the method in claim 9. Weidong/Takeo does not specifically disclose the condition is based on one or more of the following: system load, traffic, radio link propagation condition between the macro cell base station and the mobile station, height of an antenna in the macro cell base station, cell size, geographical relationship between the macro cell base station and the micro cell base station, and mobile station speed.

Gitlin discloses the condition is based on one or more of the following: system load, traffic, radio link propagation condition between the macro cell base station and the mobile station, height of an antenna in the macro cell base station, cell size, geographical relationship between the macro cell base station and the micro cell base station, and mobile station speed (col. 3, line 20-65).

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Weidong/Takeo by incorporating the teachings of Gitlin, and consequently providing the method of Weidong/Takeo to include system load, traffic, radio link propagation condition between the macro cell base station and the mobile station, height of an antenna in the macro cell base station, cell size, geographical relationship between the macro cell base station and the micro cell base station, and mobile station speed as the condition, motivation being to provide an efficient communication system by controlling traffic according cell size and other parameters.

Referring to claim 12, the combination of Weidong/Takeo/Gitlin disclose the method in claim 9. The combination of Weidong/Takeo does not disclose the downlink cell boundary is reduced by reducing a power at which a pilot signal is transmitted from a base station associated with the micro cell.

Gitlin discloses the downlink cell boundary is reduced by reducing a power at which a pilot signal is transmitted from a base station associated with the micro cell (col. 3, line 65 through col. 4, line 65).

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Weidong/Takeo by incorporating the teachings of Gitlin, and consequently providing the method of Weidong/Takeo to include the downlink cell boundary to be reduced by reducing a power at which a pilot signal is transmitted from a base station associated with the micro cell, motivation being to provide an efficient communication system by controlling traffic according cell size and other parameters.

Referring to claim 18, the combination of Weidong/Takeo disclose the apparatus in claim 17.

The combination of Weidong/Takeo does not specifically disclose means for reducing a power at which a broadcast signal is transmitted from a base station associated with the micro cell to reduce the downlink communication cell boundary.

Gitlin discloses means for reducing a power at which a broadcast signal is transmitted from a base station associated with the micro cell to reduce the downlink communication cell boundary (Figures 2-3, abstract, and col. 1, lines 5-16, col. 3, line 7 through col. 4, line 45).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the teachings of Gitlin into that of the method of Weidong/Takeo, for the purpose of providing low coverage cell.

Referring to claim 20, the combination of Weidong/Takeo disclose the apparatus in claim 17.

The combination of Weidong/Takeo does not disclose means for decreasing a detected power level of a signal transmitted by the micro cell.

Gitlin discloses means for decreasing a detected power level of a signal transmitted by the micro cell (Figures 2-3, abstract, and col. 1, lines 5-16, col. 3, line 7 through col. 4, line 45).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the teachings of Gitlin into that of the method of Weidong/Takeo, for the purpose of providing low coverage cell.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the teachings of prior art into that of the method of Weidong/Takeo, for the purpose of allowing the system to change the threshold of a pilot signal.

Referring to claim 24, Weidong disclose a node for use in a cellular communications system that includes a macro cell encompassing a smaller micro cell, the macro cell including a macro cell base station and the micro cell including a micro cell base station (Fig. 5, and page 2412, right column, "macrocell, microcell", "radius of microcell"), comprising:

a supervisory controller configured to control one or more operations of the macro cell base station and the micro cell base station (fig. 5, and page 2412, introduction, note that micro cells and macro cells inherently have base stations and base station controllers),

and a link balance controller, coupled to the supervisory controller, configured to determine a link between a downlink micro cell boundary between the macro cell, wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station, and the micro cell and an uplink micro cell boundary between the macro cell and micro cell, wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station (Figure 5, page 2412, left columns, "HCS", "macrocell, microcell", "the radius of the macrocell . . . microcell . . . antennas of the microcell", note that HCS system is disclosed where a macrocell has microcells in its coverage range, and further a HCS system ,with microcells and macrocells, inherently provides a node (link balance controller which is inherently connected to the base station and the base station controller and the switching center) determining a downlink micro cell boundary between the macro cell and the micro cell, wherein the downlink cell boundary is associated with an effective range of a

transmission from micro cell base station, and an uplink micro cell boundary between the macro cell and micro cell, wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station).

Weidong does not specifically disclose link balance controller configured to determine **whether a condition indicates that an unbalanced link should be implemented** between a downlink micro cell boundary between the macro cell, wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station, and the micro cell and an uplink micro cell boundary between the macro cell and micro cell, wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station, **and if so, to reduce the downlink micro cell boundary to implement the unbalanced link.**

Takeo teaches a method of reducing cellular coverage areas, and further discloses a link balance controller that allows **a condition in the system indicates reducing the downlink micro cell boundary** to effect an unbalance between the uplink and downlink microcell boundaries (page 1804 right and left columns, abstract, and page 1807, "In the downlink, however, when the cell area is shrunk, the total transmission power is decreased", "location of cell boundary for downlink varies", "reduce capacity in the downlink", "in the downlink, the location of cell boundary is varied according to the loss in orthogonality", note that Takeo, among other things, shows that the downlink coverage area is shrunk and there is an imbalance between the downlink coverage and uplink cell coverage. Further, loss of orthogonality is the condition).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the node of Weidong by incorporating the teachings of Takeo into that of Weidong and consequently providing the system of Weidong to provide a condition, where when the condition is met would provide information that an unbalance in cellular coverage should take place, and further to allow cell a reduction in downlink capacity to cause a downlink imbalance between the macro cell and the micro cell, and consequently causing establishing a downlink communication cell boundary between the macro cell and the micro cell **different** from the uplink communication cell boundary as suggested by Takeo, for the purpose reducing transmission power in the downlink, reducing multi-path interference, and consequently providing a better quality of service.

The combination of Weildong/Takeo does not specifically disclose link balance controller configured to determine **whether** a condition indicates that an unbalanced link **should be implemented** between a downlink micro cell boundary between the macro cell, wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station, and the micro cell and an uplink micro cell boundary between the macro cell and micro cell, wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station, **and if so, to reduce the downlink micro cell boundary to implement the unbalanced link.**

Gitlin discloses a HCS system with macrocells and microcells, and further discloses **determining whether** a condition in such HCS system is met and **if the condition is met,** reduce the coverage area of the microcell (Figures 2-3, abstract, and col. 1, lines 5-16, col. 3, line 7 through col. 4, line 45, "the u-cell so that it can support a reasonable number of users", "a

larger r and smaller d leads to a smaller average receive power at the u-base", "Hence d and r are chosen so that the u-base is robust against the M-users and can support a reasonable number u-users", "the microcell size and location is selected, and the uplink and downlink transmission power is controlled, so that the respective microcell and macrocell users can communicate without noticeable interference between each other", note that downlink transmission power of the microcell is directly related to the coverage area of the microcell, and further note that the coverage or power of the microcell is reduced so that the respective users of microcell can communicate without interference and with a great quality service).

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Weidong/Takeo by incorporating the teachings of Gitlin, and consequently providing **determining whether a condition in the system indicates that** the downlink micro cell boundary between the macro cell and the micro cell (method of Weidong/Takeo), wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station, and an uplink micro cell boundary between the macro cell and micro cell (method of Weidong/Takeo) **should be unbalanced** wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station; **and if so, to reduce the downlink micro cell boundary to implement the unbalanced link,** motivation being to reduce interference, to provide a better quality of service, to reduce channel traffic in the crowded areas, and eliminate congestion.

Referring to claim 25, the combination of Weidong/Takeo/Gitlin discloses the node in claim 24.

The combination of Weidong/Takeo does not specifically disclose the node is a radio network controller.

Gitlin discloses the node is a radio network controller (Figures 2-3, abstract, and col. 1, lines 5-16, col. 3, line 7 through col. 4, line 45, note that an RNC is an inherent part of a cellular system).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the Gitlin into that of the method of Weidong/Takeo, for the purpose of allowing the system to have an efficient system by controlling cell boundary from the RNC.

Referring to claim 26, the combination of Weidong/Takeo/Gitlin disclose the node in claim 24.

The combination of Weidong/Takeo/Gitlin does not disclose the condition is based on a probability that a mobile station in the system will not receive a predetermined service quality when the uplink and downlink micro cell boundaries are balanced.

Takeo discloses the condition is based on a probability that a mobile station in the system will not receive a predetermined service quality when the uplink and downlink micro cell boundaries are balanced (page 1804, introduction, note that normally the capacity in the downlink is larger than that in the uplink and further in CDMA systems, communications quality depends on traffic load and amount of interference from the neighboring cells, thus reducing the downlink coverage to an unbalance level would decrease the downlink capacity and therefore reduce the probability that a mobile station will not receive a predetermined service quality).

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Weildong/Gitlin by incorporating the teachings of Takeo and consequently providing condition to be based on a probability that a mobile station in the system will not receive a predetermined service quality when the uplink and downlink micro cell boundaries are balanced, for the purpose of providing better quality service.

Referring to claim 27, the combination of Weidong/Takeo/Gitlin disclose the node in claim 24.

Weidong/Takeo does not specifically disclose the condition is based on one or more of the following: system load, traffic, radio link propagation condition between the macro cell base station and the mobile station, height of an antenna in the macro cell base station, cell size, geographical relationship between the macro cell base station and the micro cell base station, and mobile station speed.

Gitlin discloses the condition is based on one or more of the following: system load, traffic, radio link propagation condition between the macro cell base station and the mobile station, height of an antenna in the macro cell base station, cell size, geographical relationship between the macro cell base station and the micro cell base station, and mobile station speed (col. 3, line 20-65).

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Weidong/Takeo by incorporating the teachings of Gitlin, and consequently providing the method of Weidong/Takeo to include system load, traffic, radio link propagation condition between the macro cell base station and the mobile station, height of an antenna in the macro cell base station, cell size, geographical relationship between the macro cell

base station and the micro cell base station, and mobile station speed as the condition, motivation being to provide an efficient communication system by controlling traffic according cell size and other parameters.

Referring to claim 33, Weidong disclose a hierarchical cell structure (HCS) system (Fig. 5, and page 2412, right column, "macrocell, microcell"), comprising:

a macro cell encompassing a smaller micro cell, the macro cell including a macro cell base station and the micro cell including a micro cell base station, and a radio network controller, coupled to the macro cell base station and the micro cell base station (Fig. 5, and page 2412, right column, "macrocell, microcell", "radius of the macrocell", "radius of microcell", note that radio network controllers are inherently coupled to the base stations of the micro and macro cells),

configured to determine a downlink micro cell boundary between the macro cell and the micro cell, wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station and an uplink micro cell boundary between the macro cell and the micro cell, wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station (Figure 5, page 2412, left columns, "HCS", "macrocell, microcell", "the radius of the macrocell . . . microcell . . . antennas of the microcell", note that HCS system is disclosed where a macrocell has microcells in its coverage range, and further a HCS system ,with microcells and macrocells, inherently provides determining a downlink micro cell boundary between the macro cell and the micro cell, wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station, and an uplink micro cell boundary between the macro cell and micro cell,

wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station).

Weidong does not specifically disclose radio network controller configured to determine **whether an unbalanced link should be implemented between a downlink micro cell boundary between the macro cell and the micro cell,** wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station **and an uplink micro cell boundary between the macro cell and the micro cell,** wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station, **and if so, to reduce the downlink micro cell boundary to implement the unbalanced link.**

Takeo teaches a method of reducing cellular coverage areas, and further discloses **a condition in the system indicates reducing the downlink micro cell boundary** to effect an unbalance between the uplink and downlink microcell boundaries (page 1804 right and left columns, abstract, and page 1807, "In the downlink, however, when the cell area is shrunk, the total transmission power is decreased", "location of cell boundary for downlink varies", "reduce capacity in the downlink", "in the downlink, the location of cell boundary is varied according to the loss in orthogonality", note that Takeo, among other things, shows that the downlink coverage area is shrunk and there is an imbalance between the downlink coverage and uplink cell coverage. Further, loss of orthogonality is the condition).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the system of Weidong by incorporating the teachings of Takeo into that of

Weidong and consequently providing the system of Weidong to determine an unbalanced link implemented between a downlink micro cell boundary between the macro cell and the micro cell, and an uplink micro cell boundary between the macro cell and the micro cell, and to reduce the downlink micro cell boundary to implement **the unbalanced link**, for the purpose reducing transmission power in the downlink, reducing multi-path interference, and consequently providing a better quality of service.

The combination of Weildong/Takeo does not specifically disclose radio network controller configured to determine **whether an unbalanced** link **should be implemented** between a downlink micro cell boundary between the macro cell and the micro cell, wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station and an uplink micro cell boundary between the macro cell and the micro cell, wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station, **and if so,** to reduce the downlink micro cell boundary to **implement the unbalanced link.**

Gitlin discloses a HCS system with macrocells and microcells, and further discloses **determining whether** a condition in such HCS system is met and **if the condition is met,** reduce the coverage area of the microcell (Figures 2-3, abstract, and col. 1, lines 5-16, col. 3, line 7 through col. 4, line 45, "the u-cell so that it can support a reasonable number of users", "a larger r and smaller d leads to a smaller average receive power at the u-base", "Hence d and r are chosen so that the u-base is robust against the M-users and can support a reasonable number u-users", "the microcell size and location is selected, and the uplink and downlink transmission

power is controlled, so that the respective microcell and macrocell users can communicate without noticeable interference between each other", note that downlink transmission power of the microcell is directly related to the coverage area of the microcell, and further note that the coverage or power of the microcell is reduced so that the respective users of microcell can communicate without interference and with a great quality service).

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the systme of Weidong/Takeo by incorporating the teachings of Gitlin, and consequently providing **determining whether an unbalanced link should be implemented between** the downlink micro cell boundary between the macro cell and the micro cell (method of Weidong/Takeo), wherein the downlink cell boundary is associated with an effective range of a transmission from micro cell base station, and an uplink micro cell boundary between the macro cell and micro cell (method of Weidong/Takeo) **should be unbalanced** wherein the uplink cell boundary is associated with a range of transmission from a mobile station to the micro cell base station; **and if so, to reduce the downlink micro cell boundary to implement the unbalanced link**, motivation being to reduce interference, to provide a better quality of service, to reduce channel traffic in the crowded areas, and eliminate congestion.

9. Claims 14, 28, 30, 34 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weidong et al (Vehicular Technology Conference; May 6-9, 2001; Volume 4; pages 2412-2415), in view of Takeo (Vehicular Technology Conference; IEEE 49th, Volume 3, May 16-20, 1999; pages 1804-1808), and further in view of Gitlin et al (US Patent No. 6438379 B1), and further in view of Takeo (US 6385183 B1).

Referring to claim 14, the combination of Weidong/Takeo/Gitlin disclose the method in claim 9.

- The combination of Weidong/Takeo/Gitlin does not specifically disclose the downlink cell boundary is reduced by decreasing a detected power level of a pilot transmitted by the micro cell base station.

Takeo the downlink cell boundary is reduced by decreasing a detected power level of a pilot transmitted by the micro cell base station (figure 9-11, col. 16, lines 15-65, and col. 17, line 42 – col. 18, line 40, "pilot-signal is reduced so that the cell contracts").

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Weidong/Takeo/Gitlin by incorporating the teachings of Gitlin, and consequently providing the method of Weidong/Takeo/Gitlin's cell boundary to be reduced by decreasing a detected power level of a pilot transmitted by the micro cell base station, motivation being to provide an efficient communication system by controlling traffic according cell size and other parameters.

Referring to claim 28,the combination of Weidong/Takeo/Gitlin disclose the node in claim 24.

The combination of Weidong/Takeo/Gitlin does not specifically disclose link balance controller is configured to transmit a command to the micro cell base station to reduce a power at which a pilot signal is transmitted from the micro cell base station.

Takeo discloses a link balance controller is configured to transmit a command to the micro cell base station to reduce a power at which a pilot signal is transmitted from the micro

cell base station (figure 9-11, col. 16, lines 15-65, and col. 17, line 42 – col. 18, line 40, "pilot-signal is reduced so that the cell contracts").

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Weidong/Takeo/Gitlin by incorporating the teachings of Gitlin, and consequently providing the node of Weidong/Takeo/Gitlin's cell boundary to be reduced by decreasing a detected power level of a pilot transmitted by the micro cell base station, motivation being to provide an efficient communication system by controlling traffic according cell size and other parameters.

Referring to claim 30, the combination of Weidong/Takeo disclose the node in claim 24.

The combination of Weidong/Takeo does not disclose the link balance controller is configured to employ an offset to reduce a detected power level of a pilot transmitted by the micro cell base station.

Takeo discloses the link balance controller is configured to employ an offset to reduce a detected power level of a pilot transmitted by the micro cell base station.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the teachings of Takeo into that of Weidong/Takeo/Gitlin, by providing an offset to reduce a detected power level of a pilot transmitted by the micro cell base station, consequently to provide better signal quality communication.

Referring to claim 34, the combination Weidong/Takeo/Gitlin disclose the HCS system in claim 33.

The combination Weidong/Takeo/Gitlin does not specifically disclose radio network controller is configured to transmit a command to the micro cell base station to reduce a power at which a pilot signal is transmitted from the micro cell base station.

Takeo discloses radio network controller is configured to transmit a command to the micro cell base station to reduce a power at which a pilot signal is transmitted from the micro cell base station (figure 9-11, col. 16, lines 15-65, and col. 17, line 42 – col. 18, line 40, "pilot-signal is reduced so that the cell contracts").

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Weidong/Takeo/Gitlin by incorporating the teachings of Gitlin, and consequently providing the system of Weidong/Takeo/Gitlin's cell boundary to be reduced by decreasing a detected power level of a pilot transmitted by the micro cell base station, motivation being to provide an efficient communication system by controlling traffic according cell size and other parameters.

Referring to claim 36, the combination of Weidong/Takeo disclose the HCS system in claim 33.

The combination of Weidong/Takeo does not disclose radio network controller is configured to employ an offset to reduce a detected power level of a pilot transmitted by the micro cell base station.

Takeo discloses radio network controller is configured to employ an offset to reduce a detected power level of a pilot transmitted by the micro cell base station (figures 9-11, col. 16, line 15 through col. 18, line 40, note that pilot signal is reduced and an offset is inherently used to do so).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the HCS system of Weidong/Takeo/Gitlin with the teachings of Takeo and consequently providing an offset to reduce a detected power level of a pilot transmitted by the micro cell base station for the purpose of providing better signal quality communication.

Referring to claim 37, the combination of Weidon/TakeoGitlin/Takeo disclose the HCS system in claim 36.

The combination of Weidong/Takeo/Gitlin does not disclose the radio network controller sends a command with the offset to one or more mobile stations in the system to reduce mobile-detected pilot power levels.

Takeo discloses radio network controller is configured to employ an offset to reduce a detected power level of a pilot transmitted by the micro cell base station (figures 9-11, col. 16, line 15 through col. 18, line 40).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the HCS system of Weidong/Takeo/Gitlin with the teachings of Takeo and consequently providing an offset to reduce a detected power level of a pilot transmitted by the micro cell base station and providing the radio network controller to send a command with the offset to one or more mobile stations in the system to reduce mobile-detected pilot power levels, motivation being for the purpose of providing better signal quality communication.

10. Claims 15 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weidong et al (Vehicular Technology Conference; May 6-9, 2001; Volume 4; pages 2412-2415), in view of Takeo (Vehicular Technology Conference; IEEE 49th, Volume 3, May 16-20, 1999;

pages 1804-1808), further in view of Gitlin et al (US Patent No. 6438379 B1), and further in view of Ranta et al (US 6233299 B1).

Referring to claim 15, the combination of Weidong/Takeo/Gitlin disclose the method in claim 9.

The combination of Weidong/Takeo/Gitlin does not disclose determining if interference associated with an uplink transmission from a mobile station to the macro cell base station is likely to exceed a predetermined limit, and if so, performing interference cancellation the micro cell base station.

Ranta discloses interference cancellation which cancel effects of co-channel interference (abstract, and col. 2, lines 5-55).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weildong/Takeo/Gitlin by incorporating the teachings of Ranta, for the purpose of reducing interference and providing better quality service.

Referring to claim 32, the combination of Weidong/Takeo/Gitlin disclose the node in claim 24.

The combination of Weidong/Takeo/Gitlin does not disclose link balance controller is configured to determine if interference associated with an uplink transmission from a mobile station to the macro cell base station is likely to exceed a predetermined limit, and if so, to transmit a command to the micro cell base station to perform interference cancellation.

Ranta discloses interference cancellation which cancel effects of co-channel interference (abstract, and col. 2, lines 5-55).

It would have been obvious to one of the ordinary skills in the art at the invention was made to modify the method of Weildong/Takeo/Gitlin by incorporating the teachings of Ranta, for the purpose of reducing interference and providing better quality service.

11. Claim 13 and 29, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weidong et al (Vehicular Technology Conference; May 6-9, 2001; Volume 4; pages 2412-2415), in view of Takeo (Vehicular Technology Conference; IEEE 49th, Volume 3, May 16-20, 1999; pages 1804-1808), in view of Gitlin et al (US Patent No. 6438379 B1), and further in view of Kim et al (US 6456652 B1).

Referring to claim 13, the combination of Weidong/Takeo/Gitlin disclose the method in claim 9.

The combination of Weidong/Takeo/Gitlin does not disclose the downlink communication cell boundary is established by tilting a downlink antenna beam of a base station associated with the micro cell that transmits a broadcast signal from the micro cell to reduce the coverage of the broadcast signal.

Kim discloses the downlink communication cell boundary is established by tilting a downlink antenna beam of a base station associated with the micro cell that transmits a broadcast signal from the micro cell to reduce the coverage of the broadcast signal (col. 1, lines 5-45, col. 2, lines30-50).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the teachings of Kim into the method of Weidong/Takeo/Gitlin, and providing the downlink communication cell boundary to be established by tilting a downlink antenna beam of a base station associated with the micro cell that transmits a broadcast signal from the micro cell to reduce the coverage of the broadcast signal, for the purpose of optimizing cell coverage to a first order.

Referring to claim 29, the combination of Weidong/Takeo/Gitlin disclose the node in claim 24.

The combination of Weidong/Takeo/Gitlin does not disclose link balance controller is configured to transmit a command to the micro cell base station **to tilt** a downlink antenna beam of the micro cell base station that transmits a pilot signal from the micro cell.

Kim discloses the downlink communication cell boundary is established by tilting a downlink antenna beam of a base station associated with the micro cell that transmits a broadcast signal from the micro cell to reduce the coverage of the broadcast signal (col. 1, lines 5-45, col. 2, lines30-50).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the HCS system of Weidong/Takeo/Gitlin to provide link balance controller to be configured to transmit a command to the micro cell base station **to tilt** a downlink antenna beam of the micro cell base station that transmits a pilot signal from the micro cell, for the purpose of providing better signal quality communication.

Referring to claim 35, the combination of Weidong/Takeo/Gitlin disclose the HCS system in claim 33.

The combination of Weidong/Takeo/Gitlin does not disclose radio network controller is configured to transmit a command to the micro cell base station **to tilt a** downlink antenna beam of the micro cell base station that transmits a pilot signal from the micro cell.

Kim disclose radio network controller is configured to transmit a command to the micro cell base station **to tilt a** downlink antenna beam of the micro cell base station that transmits a pilot signal from the micro cell (col. 1, lines 5-45, col. 2, lines30-50)

It would have been obvious to one of the ordinary skill in the art at the time of the invention to incorporate the teachings of Kim and providing theh base station **to tilt a** downlink antenna beam of the micro cell base station that transmits a pilot signal from the micro cell, for the purpose of providing better signal quality communication.

Allowable Subject Matter

12. Claims 17 and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

13. Applicant's arguments with respect to claims 22, and 30-31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred A. Casca whose telephone number is (571) 272-7918. The examiner can normally be reached on Monday through Friday from 9 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lester Kincaid, can be reached at (571) 272-7922. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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